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EXAMINER	
LIU, SHUWANG	
ART UNIT	**PAPER NUMBER**
2634	

DATE MAILED: 09/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/877,608	JECKELN ET AL.	
	Examiner	Art Unit	
	Shuwang Liu	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,8,16 and 17* is/are rejected.

7)☒ Claim(s) *4-7 and 9-15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, regarding claims 1 and 8, filed 07/12/05 have been fully considered but they are not persuasive. The Examiner has thoroughly reviewed Applicant's arguments but firmly believes that the cited reference reasonably and properly meets the claimed limitation as rejected.

(1) Regarding Helms' reference:

Applicant's argument – "The claimed invention calls for the synthesis of predistorted signal using only one LUT for the whole communication signal whenever it is single- or multiple-carrier signal, in sharp contrast with Helm's method of generating the predistorted signal using multiples LUT, i.e. one LUT per carrier."

Examiner's response –First, in response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the synthesis of predistorted signal using only on LUT for the whole communication signal) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Secondly, the multiple LUTs are recited in the limitation of "controlled by means of amplitude and phase look-up **tables** stored in a distorting generator" instead of only one LUT.

(2) Regarding Persson's reference:

Applicant's argument –"In sharp contrast with the method recited in Applications' claims which does not require any distortion signal or any training sequence to pre-compensate for nonlinearity of the PA" and In Person, each I and Q predistorted signal is converted to analog voltages that are used to modulate an RF carrier using I-Q modulator, whereas the claimed invention teaches digitally modulating I and Q predistorted signal to avoid any problem related to analog modulation."

Examiner's response – In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "does not require any distortion signal or any training sequence to pre-compensate for nonlinearity of the PA" and "the claimed invention teaches digitally modulating I and Q predistorted signal") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

(3) The rejection in the previous is under 35 USC 103 (a) by combining two references. Therefore, the Applicant cannot show non-obviousness by attacking references individually where, as here the rejections are based on combination of reference. *In re Keller*, 208 USPQ 871 (CCPA 181).

2. Applicant's arguments with respect to claims 16 and 17 have been considered but are moot in view of the new ground(s) of rejection because of the amendment.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helms (US 2001/0014592) in view of Persson (US 6,246,286).

As shown in figure 4, Helms discloses:

(1) regarding claim 1:

an adaptive method and an adaptive device for predistorting a signal to be transmitted, supplied by a signal source to an input of a power amplifier having an output for delivering an amplified output signal, comprising:

predistorting the RF modulated signal to be transmitted using an I and Q modulator (I and Q components and PDD as shown in figure 4) interposed between the signal source (not shown) and the input of the power amplifier (PA), and controlled by means of amplitude and phase look-up **tables** (LUTs) stored in a distorting generator (see DM, ADC, DDC, AE(IP) in figure 4);

producing, via a first digital receiver (DDC1), a first feedback signal (output from DDC1) in response to the RF predistorted signal (output from ADC);

producing, via a second digital receiver (DDC2), a second feedback signal (output from DDC2) in response to the RF amplified output signal (output from ADC) from the power amplifier;

modeling (by AE(IP)) the power amplifier in response to the first and second feedback signals; and

updating the predistortion look-up tables means in response to said modeling of the power amplifier (paragraph 0033 on page 3).

Helms discloses all of the subject matter as described above except for specifically teaching the look-up tables which is an amplitude and phase look-up table as claimed.

Persson, in the same field of endeavor, teaches the amplitude and phase look-up table (111 in figure 6) in the adaptive device (column 10, lines 46-51 and column 12, lines 12-18).

One skilled in the art would have clearly recognized phase and amplitude are two basic characteristics of a signal, which cause the distortion associated with power amplifier and are measured during amplification of distortion detection signal. Based on the measured amplitude and phase distortion and known characteristics of the distortion detection signal, relationships between the input power and amplitude and phase distortion are calculated. It would be desirable to have an adaptive liberalization technique that can be effectively compensation for time-varying nonlinearities of power amplifier and at the same time relax the processing requirements of digital signal processor and decrease current consumption (column 1, line 32-column 2, line 63,

Persson). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to adopt the two basic characteristics of phase and amplitude in look-up table as taught by Persson in the look-up table of Helms in order to effectively compensation for time-varying nonlinearities of power amplifier and at the same time relax the processing requirements of digital signal processor and decrease current consumption.

(2) regarding claim 2

wherein said first feedback signal includes the complex envelope (I and Q output from DDC1) of the RF predistorting signal.

(3) regarding claim 3:

wherein said second feedback signal includes the complex envelope (I and Q output from DDC2) of the RF amplified output signal.

(4) regarding claims 8:

a transmitter system for amplifying and up-converting a baseband signal from a signal source; said transmitter system comprising:

a power amplifier (PA) having a signal input and an amplified signal output;

an I and Q modulator (not shown , but output I and Q components from the modulator as shown in figure 4) interposed between the signal source and said signal input;

a distorting generator (LUT) including predistortion amplitude and phase look-up tables (LUTs); said distorting generator controlling said I and Q modulator to predistort the RF modulated signal in amplitude and in phase;

a first digital receiver (DDC1) producing a first feedback signal in response to the RF predistorted signal from said I/Q modulator;

a second digital receiver (DDC2) producing a second feedback signal in response to the RF amplified signal output;

a control module (AE(IP)) receiving said first and second feedback signals from said first and second digital receiver', said control module being so configured as lo model said power amplifier in response to the first and second feedback signals and to update said look-up tables of said distorting generator in response to a dynamic modeling of said power amplifier (paragraphs 0028-0033 on page 3).

Helms discloses all of the subject matter as described above except for specifically teaching the look-up tables which is an amplitude and phase look-up table as claimed.

Persson, in the same field of endeavor, teaches the amplitude and phase look-up table (111 in figure 6) in the adaptive device (column 10, lines 46-51 and column 12, lines 12-18).

One skilled in the art would have clearly recognized phase and amplitude are two basic characteristics of a signal, which cause the distortion associated with power amplifier and are measured during amplification of distortion detection signal. Based on the measured amplitude and phase distortion and known characteristics of the distortion detection signal, relationships between the input power and amplitude and phase distortion are calculated. It would be desirable to have an adaptive liberalization technique that can be effectively compensation for time-varying nonlinearities of power

amplifier and at the same time relax the processing requirements of digital signal processor and decrease current consumption (column 1, line 32-column 2, line 63, Persson). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to adopt the two basic characteristics of phase and amplitude in look-up table as taught by Persson in the look-up table of Helms in order to effectively compensation for time-varying nonlinearities of power amplifier and at the same time relax the processing requirements of digital signal processor and decrease current consumption.

5. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Francos et al. (US 6,741,662) in view of Persson (US 6,246,286).

As shown in figures 2A and 2B, Francos et al. discloses a transmitter system for up-converting and amplifying a noseband signal from a signal, comprising:

a power amplifier having a signal input and an amplified signal output (23);

an I/Q modulator (32, 34, 36, 38 and 82) interposed between the baseband signal source and the signal input;

a distorting generator (84, 86, and 70) including phase look-up tables (84), said distorting generator controlling said I/Q modulator to predistort the baseband signal (column 3, lines 43-51);

an up-converter (it is inherent to have up-converter in side 48 for the transmitter) receiving the predistorted baseband signal, said up-converter being so configured as to

supply an up-converted predistorted signal to said signal input of said power amplifier (23);

a digital receiver (55) producing a feedback signal in response to the up-converted amplified output signal from said amplified signal output; and

a control module (72 and 80) receiving a delayed reference signal (from 68) from said I/Q modulator and the feedback signal (C) from said digital receiver, said control module being so configured as to model the transmitter system in response to the reference and feedback signals and to update the look-up tables of said distorting generator in response to a dynamic non-linearity and memory effect modeling of the transmitter system (column 3, line 42-column 5, line 36).

Francos et al. discloses all of the subject matter as described above except for specifically teaching the look-up tables which is an amplitude and phase look-up table as claimed.

Persson, in the same field of endeavor, teaches the amplitude and phase look-up table (111 in figure 6) in the adaptive device (column 10, lines 46-51 and column 12, lines 12-18).

One skilled in the art would have clearly recognized phase and amplitude are two basic characteristics of a signal, which cause the distortion associated with power amplifier and are measured during amplification of distortion detection signal. Based on the measured amplitude and phase distortion and known characteristics of the distortion detection signal, relationships between the input power and amplitude and phase distortion are calculated. It would be desirable to have an adaptive liberalization

technique that can be effectively compensation for time-varying nonlinearities of power amplifier and at the same time relax the processing requirements of digital signal processor and decrease current consumption (column 1, line 32-column 2, line 63, Persson). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to adopt the two basic characteristics of phase and amplitude in look-up table as taught by Persson in the look-up table of Francos et al. in order to effectively compensation for time-varying nonlinearities of power amplifier and at the same time relax the processing requirements of digital signal processor and decrease current consumption.

Allowable Subject Matter

6. Claims 4-7 and 9-15 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shuwang Liu whose telephone number is 571 272-3036. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571 272-3056. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Shuwang Liu
Primary Examiner
Art Unit 2634

August 29, 2005